Nursery Health Tracts, No. 3.

Diphtheria.

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THIS series of "Nursery Health Tracts" is designed to meet the demand for various special articles, on important subjects, which have appeared in BABYHOOD. Articles thus reprinted will be furnished at 5 cents each, or $3 per hundred, postpaid.

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DIPHTHERIA.

BY HENRY DWIGHT CHAPIN, M.A., M.D.,

Professor of Diseases of Children at the New York Post-Graduate Medical School and Hospital, and at the Woman's Medical College of the New York Infirmary; Attending Physician to the Demilt Dispensary.

DIPHTHERIA is now such a common and widely-diffused disease that every mother and teacher should have some idea of its manifestations. The earlier it can be recognized the better will be the chance of controlling its ravages. It is particularly apt to attack the period of childhood, the majority of cases occurring under ten years. Adults, however, do not always escape, although children show the greatest susceptibility.

Nature of the Disease.

There has been much dispute as to whether diphtheria is a local or constitutional disease. By this is meant that some physicians consider it purely a throat trouble at first, additional symptoms being due to absorption of the poison from this point. Others, again,

think that the disease is from the beginning constitutional, or in the system, and that the inflammation in the throat is the first manifestation of the action of the general poison. These questions have not much interest to the laity, for, even if the disease is not constitutional from the very first, it quickly becomes so, and must accordingly be treated on that basis.

Contrast with Other Contagious Diseases.

Diphtheria differs in several remarkable respects from the other contagious diseases. In the first place, it is very often secondary, particularly during epidemics of other infectious diseases, ingrafting itself upon the original disease, thus rendering the outlook much graver. It is especially apt to complicate maladies, like scarlet-fever or measles, that are accompanied by an inflammation about the throat. Then, again, one attack of diphtheria does not confer immunity from another. All other contagious diseases—with exceptions that are so rare as not to be considered—occur but once, the virus having apparently exhausted the susceptibility of the system by one attack. It is perfectly

possible for a child, under certain conditions, to have diphtheria every year. Finally, diphtheria does not run a fixed course that is invariable as to time and sequence of symptoms, like the other contagious diseases. Scarlet-fever and measles may vary widely in the severity of different cases, but the invasion and decline are always at the same interval of time. Diphtheria, on the contrary, may last anywhere from two or three days to several weeks. Diphtheria may also occur as a primary disease. It is more apt to attack a person with a cold or an ordinary catarrhal inflammation of the throat. Diphtheria is not only directly contagious from person to person, but there is reason to believe that the disease can be produced by filth and foul exhalations. Emanations from sewers and cesspools that poison the atmosphere of some houses may be alone responsible for the malady.

Symptoms.

There is perhaps no disease whose type varies within such wide limits as diphtheria. Many cases are so mild that the children are hardly considered ill, and are not even put to bed. The true nature of such cases is

frequently overlooked, and they inflict great damage by spreading the disease in a neighborhood. On the other hand, diphtheria may be so malignant as to kill almost in a few hours, before the false membrane has time fully to form. Between these extremes there is every grade of severity. It must be thoroughly understood at the start that all cases of diphtheria are liable to be dangerous, if not fatal. The disease does not usually begin very abruptly. There may be slight chilliness followed by fever, with headache and pains in the back and limbs. The appetite is lost, and a feeling of languor is often experienced. The fever does not usually run very high, even in severe cases, and by the third day the temperature may be down almost to the normal, although the disease has by no means run its course. The earlier signs of diphtheria are a good deal like those of a heavy cold. This makes an early recognition of the throat symptoms of great importance. Patients generally complain first of a feeling of soreness, with more or less fullness in the throat. The sensation of pain is no greater, as a rule, than is experienced in ordinary inflammations of this part. Indeed, there is often no complaint of

sore throat at all. I have seen cases of malignant diphtheria where all the structures of the throat were covered with false membrane, and yet the children, when questioned, would deny the existence of any local pain. *In every case of illness in children a careful examination of the throat should be made.*

Examination of the Throat.

To be able to make a satisfactory examination some knowledge of the structure of the throat is necessary. When the mouth is opened wide (see Fig. 1) there are seen on either side of the root of the tongue two small, oval bodies called the tonsils. These lie between the pillars of the palate, which extend up to the soft palate, that forms the upper and back boundary of the mouth.

Hanging down from the middle of the soft palate is a small structure called the uvula. All these parts must be brought distinctly into view to make a satisfactory examination. In order to do this the tongue must be pressed downward. A tongue-depresser, or the handle of a spoon, will accomplish this end. The mistake commonly made is in not putting the depressor far enough back to reach the

base of the tongue. If pressure is made upon the forward part of this organ the back part will immediately arch up and completely conceal the other structures of the throat. After inserting the depressor well back, pull

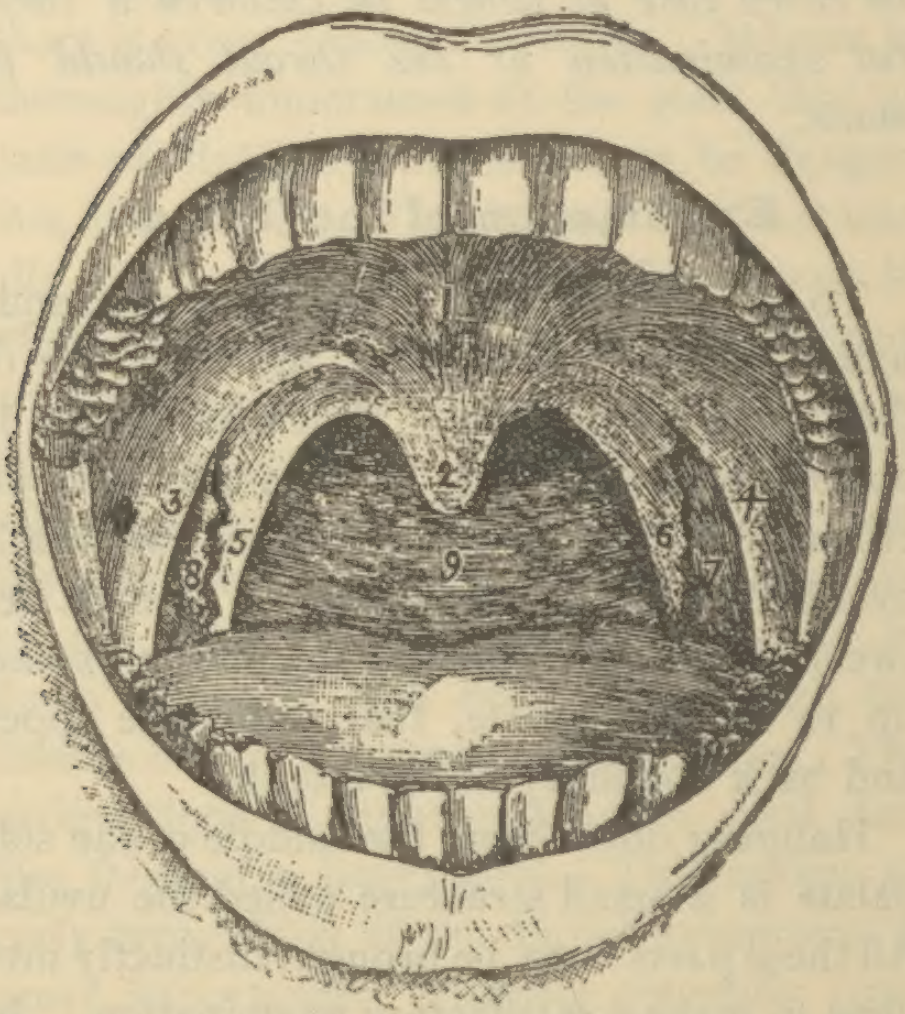

FIG. 1.—NORMAL APPEARANCE OF THE THROAT.—1, Soft Palate; 2, Uvula; 3, 4, 5, 6, Pillars of the Palate; 7, 8, Tonsils; 9, Pharnyx.

downwards and forwards, and all parts will come into plain view. It is absolutely necessary to have a good light. The child should

sit upright on the nurse's lap, if possible before a window with a southern exposure. If the examination is made at night it is generally useless to try to see by gas-light. By using a candle, however, held in the examiner's hand, with the bowl of a tablespoon for a reflector and to keep the glare from the examiner's eyes, a good light can be thrown into the mouth. When this is not to be had I have used a lighted match. Some small object like this is much more satisfactory than a large lamp, that cannot well be regulated to the movements of the child. If the child is young its hands should always be held, in order to avoid interference at the critical moment. Sometimes a child will refuse to open its mouth at all. In such a case the nose may be held until the mouth is partly opened for air, when the depressor can be quickly slipped in and the parts brought into view.

The diphtheritic false membrane is oftenest seen first upon the tonsils and pillars of the palate; hence these parts must be subjected to careful scrutiny. The whole throat is usually reddened and inflamed, but some hours after the beginning of the disease a slightly-raised patch appears at some part,

which is the first manifestation of a diphtheritic false membrane.

Character of Diphtheritic False Membrane.

The false membrane has a grayish white color, and not only lies upon but deeply penetrates the mucous membrane, upon which it is situated. Persons often inquire why diphtheritic false membrane cannot be easily detached when in plain sight. The mucous membrane of the part is so penetrated by the false membrane, that an ulcerated, bleeding surface is left behind when it is forcibly detached. Upon this raw surface diphtheritic membrane will quickly re-form, thicker than ever, from the irritation to which the part has been subjected. It is like trying to tear up grass without disturbing the soil in which its roots are grounded. We only renew the strength of the false membrane, as irritation of all kinds provokes its growth and spread.

Structure of False Membrane.

The false membrane consists of a coagulated, tenacious substance, called fibrin, that

is exuded from the blood-vessels as a result of diphtheritic inflammation, of degenerated epithelial cells, of pus, and small living organisms called bacteria. Decomposition of the false membrane begins in a few days, when it softens and changes to a dirty-brown color. Its separation is effected by the secretions of the mucous membrane, and is usually gradual and accompanied by a sort of liquefaction. The edges of the diphtheritic patch are thinner than the center, and surrounded by red, inflamed mucous membrane. The severity and danger of an attack of diphtheria depend largely upon the extent of the false membrane and its tendency to spread to structures outside of the throat.

Spread of the False Membrane.

When the diphtheritic membrane is only situated upon the tonsils the disease is not apt to be severe. The reason of this is that the breathing is not much interfered with, and, as the absorbents are not active in the tonsils, the poison will not reach the blood in large quantity. If the false membrane spreads up or down, however, the results are serious.

Diphtheritic Croup.

Sometimes the false membrane will extend downwards, reaching the larynx, or opening of the windpipe, and cover over the vocal cords. This is a very fatal accident, as suffocation is caused by closure of the air-passages by false membrane. The opening between the vocal cords is a comparatively narrow chink, and it does not take much obstruction to completely close it. (See Fig. 2.)

FIG. 2.—1, Vocal Cords; 2, Chink between Cords, opening into Windpipe; 3, Epiglottis, at Base of Tongue.

The croupy symptoms come on gradually. At first there is a slight huskiness of the voice and rather a hoarse cough, but no interference with breathing. Soon, however, the child feels the want of air as the membrane fills up the air-passages. Restlessness, with a worried look in the face, come on, and the cough has a suppressed sound. The voice gradually becomes whispering and is finally lost. As the struggle for air becomes more intense the soft parts of the chest suck

in with each inspiration, and the extremities become blue. These patients almost always die, unless surgical means of relief to open the wind-pipe are employed, and even then a large proportion perish. It may take several days for diphtheritic croup to come to a fatal termination. The symptoms are gradual, but slowly and surely progressive.

Nasal Diphtheria.

Not infrequently the false membrane spreads up along the pillars of the palate, covering the uvula and finally reaching up to the back of the nose. As the absorbents of the nose are very active, when this organ is involved by the false membrane, the poison is quickly carried to all parts of the system. This being a grave condition, it is well to recognize it as soon as possible. It is very difficult to look into the nose and see the false membrane, but there are ways in which we may recognize its presence. As stated above, the false membrane usually invades the nose from behind by creeping up the pillars of the palate. When, therefore, we see the false membrane so extending and involving the upper part of the soft palate, it must of necessity next involve the nose. The

presence of another symptom at this time will make certain our suspicion—namely, the beginning of a discharge of thin mucus from the nose, very often tinged with blood. The discharge keeps increasing and causes much irritation around the nostrils and on the upper lip. Crusts may here form, under which the skin will be deeply excoriated. The occurrence of nasal diphtheria is always accompanied by an increased severity of the general disease.

Diphtheritic Blood-Poisoning.

There are two ways in which the blood is poisoned in diphtheria: first, by the specific poison that is the cause of the disease; and, second, by absorption of the decomposing false membrane. The latter form of blood-poisoning is particularly marked in nasal diphtheria, from the cause already given. A child with much blood-poisoning presents certain symptoms that are fairly uniform. It seems sicker and the features assume a pale, sometimes almost a waxy, appearance. The appetite fails and the pulse grows weak and compressible. Various vital organs, notably the heart and kidneys, suffer at this time. If the urine is passed in diminished quantities,

and there be convulsions or coma, the latter organs have been attacked by the poison.

Causes of Death.

It may be well to summarize the most dangerous phases of diphtheria by enumerating the causes of death. Broadly speaking, blood-poisoning, of the two varieties already named, may be considered a very common cause. In malignant cases death may take place before the false membrane has time to form, the system being completely overpowered by the severity of the poison. Sudden heart-failure from paralysis of that organ may be responsible for death. It is not unusual for a child to faint upon sitting up, or at the slightest exertion, from feeble action of this organ during diphtheria. A secondary congestion of the lungs, due to a persistently weak heart, carries off not a few. Diphtheritic croup, from descent of the false membrane into the air passages, causes many of the deaths in this disease. Perhaps the most insidious cause of a fatal ending is a failure of the kidneys to act. In scarlet fever, and certain other infectious diseases complicated by inflammation of the kindeys, there is dropsy and some other sign to warn us of impending

danger; but in diphtheria, convulsions or coma, quickly followed by death, may be the first intimation of trouble. In all cases of diphtheria the urine should be repeatedly examined to insure a timely recognition of this severe complication.

Diphtheritic Paralysis.

At a period late in the disease, usually during convalesence and when the family are congratulating themselves upon the recovery, a very peculiar symptom sometimes sets in — namely, paralysis. It may even be delayed for several weeks after the disease has ceased. The muscles of the throat are oftenest attacked, the soft palate hanging down limp and powerless; and when attempt is made to swallow, the more fluid portion of the food is partially expelled through the nose. This is owing to a failure of the soft palate to close the passage to the nose during swallowing. The eye-muscles may be affected, causing squint. The limbs are not infrequently attacked by paralysis, an arm and a leg on one side, or both legs, or perhaps a single arm or leg. The paralysis often comes on insidiously, it being noticed that the child begins to lose power in walking or standing. It frequently

takes the form of paresis, or incomplete paralysis. Sometimes the child first complains of a sensation of numbness or tingling in the affected limb. The cause of diphtheritic paralysis is supposed to be an inflammation in the end fibres of the nerves that are distributed to the muscles affected, being induced by the poison of the disease. Recovery nearly always takes place, but it may be several months before the muscles completely regain power.

What Diphtheria is NOT.

There is a very common disease of the throat, accompanied by a white exudation, that is frequently confounded with diphtheria. The mucous membrane of the throat, particularly of the tonsils, is studded with numerous small holes called follicles. These follicles secrete mucus, and when the throat is inflamed from any cause mucus and pus collect in the mouths of the follicles, appearing as a whitish exudation. The tonsils

FIG. 3.—Tonsilitis.

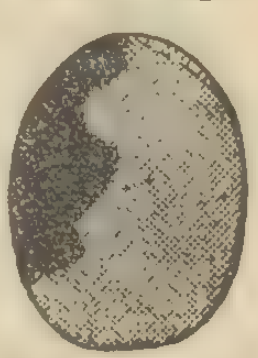

FIG. 4.—Diphtheria.

are oftenest the seat of local inflammation, the disease being known as tonsilitis. The confusion that exists is between simple tonsilitis with points of exudation, and diphtheria with a false membrane. The following considerations will help to distinguish these affections:

In tonsilitis there is no membrane, but the exudation is pushed up out of the follicles, forming numerous separate points (Fig. 3) that usually remain distinct throughout the disease. These small, white points can generally be scraped off without leaving a bleeding or especially irritated surface. In diphtheria there is a grayish-white false membrane (Fig. 4), not raised much above the mucous membrane, but deeply adherent to it and surrounded by an area of angry looking inflammation. There is generally only one patch upon the tonsil, but if the false membrane does form from several foci, as shown in Fig. 5, they will be apt to coalesce within twelve or twenty-four hours

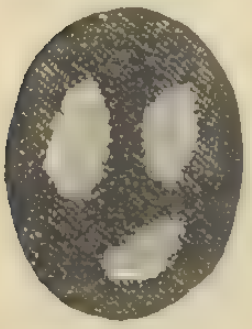

FIG. 5.—Diphtheritic membrane in patches.

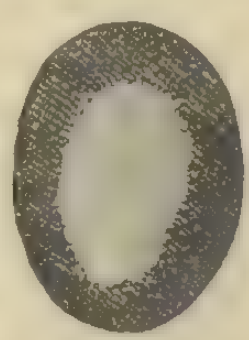

FIG. 6.—Coalescence of patches in 12 to 24 hours.

to form a single membrane, as in Fig. 6, and not remain distinct throughout the disease.*

The symptoms are likewise different in these two disorders. Tonsilitis begins abruptly with a severe chill, followed by a high fever, with intense headache and general prostration. The disease, however, runs its course in three or four days and is followed by no complications or sequelæ. Diphtheria begins much more insidiously, and it is often hard for the child to say exactly when the illness began. The symptoms at first are not so urgent as in tonsilitis, but in a few days the differences between a simple local inflammation and a grave constitutional disease are apt to manifest themselves.

"Diphtheritic Sore Throat."

This is a term often used by the laity, and not so often by physicians. The name is not only unscientific as ordinarily employed, but dangerous, as it implies that while the throat may have a diphtheritic appearance, the patient is still not suffering from a constitutional disease that may be communicated to

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* The illustrations in this article are more sharply defined than in life, to give a clear idea of contrasts. The margins of diphtheritic membrane usually shade off gradually.

others. Hence the cases are not isolated, as they should be.

Either a patient has or has not diphtheria. In some cases it is very difficult, if not impossible, to say with certainty for a day or so that a case is diphtheria. In the meantime nothing is gained by lulling ourselves into a sense of false security by such a term as "diphtheritic sore throat." All suspicious cases must be at once isolated until the true nature of the disease is apparent. No harm is done by quarantining an uncertain case of simple tonsilitis for a few days. Indeed, it is strongly probable that all forms of sore throat attended by an exudation are more or less contagious, and hence it is better to keep them isolated.

Anything may Become Diphtheritic.

The tendency of diphtheria to engraft itself upon all forms of simple inflammation has already been noted. Extra attention should be paid to all varieties of sore throat when diphtheria is prevalent. A case of simple tonsilitis may in a few days be transformed into diphtheria. There are no hard-and-fast rules to guide us with reference to such a transition. Isolation and careful

watchfulness must lead us in these puzzling cases.

Treatment.

All cases of diphtheria should be under the care of a competent physician, as indeed every case of cold or inflammation about the throat. But there are certain simple hygienic rules that can be followed until one is procured. Children with diphtheria, no matter how mild, should be put to bed and kept there until all manifestations of the disease have ceased. Walking cases of mild diphtheria not only infect others, but are liable to dangerous symptoms, notably croup. The diphtheritic false membrane runs along inflamed surfaces, and if the child, by being exposed to draughts, contracts a slight bronchitis, the membrane will almost surely descend and produce suffocation. It is a fact that croup is especially liable to complicate mild cases of diphtheria. Kidney trouble or sudden heart-failure is more apt to affect children who are out of bed.

To relieve local inflammation and help the separation of false membrane it is well to apply large, hot flaxseed-meal poultices to the neck. The false membrane must be frequently disinfected by sprays containing

carbolic acid or other disinfectants. As diphtheria is an exhausting disease, large quantities of milk and beef-tea may be administered to keep up the strength. It is best to give no solid food.

The object of medicinal treatment is to eliminate the poison as much as possible from the body, and at the same time counteract its effects on the system. This is best accomplished by starting with a saline or mercurial laxative, followed by large doses of tincture of iron to maintain the integrity of the red blood corpuscles, and alcohol to steady the heart and counteract blood-poisoning. The most successful results will be reached by skillfully treating certain symptoms as they arise, and avoiding complications, if possible, by our knowledge of the natural history of the disease. Any special plan of treatment claiming uniformly good results is dishonest, inasmuch as investigation will show that most of the cases were simple tonsilitis, and not the Protean malady known at diphtheria.